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## Lab develops detector, software to improve inspection

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WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Researchers from the Air Force Research Laboratory recently traveled to Hill AFB, Utah, to train depot production radiography personnel to use digital radiography systems, a technology that could improve and simplify nondestructive inspection of aircraft airframes and structures.

Researchers demonstrated the use of a high-resolution digital flat-panel x-ray detector and its respective software. The transition to digital radiography technology provides people at air logistics centers with highly improved tools for evaluating complex aircraft structures. The technology also provides people with high-resolution capability, enhanced performance and reliability over conventional film-based radiography methods.

Under a contract with the AFRL Materials and Manufacturing Directorate nondestructive evaluation branch, General Electric Corporate Research and Development Center, Advanced X-ray Inc. and Varian Inc. were asked to deliver products for use in the nondestructive inspection of aircraft structures. Non-destructive inspection and evaluation of aircraft eliminates the

need for unnecessary maintenance and aircraft disassembly, which has the potential for creating additional damage and problems in aging Air Force systems.

Radiography inspection is used during aircraft manufacturing, maintenance and repair to locate hidden defects such as cracking, corrosion, foreign object damage, voids and moisture in aircraft materials and structures. It is also used extensively during the manufacturing of aircraft turbine engine components to detect and evaluate cavities, micro-shrinkage, porosity, inclusions, cracking and to inspect the internal geometry of components.

Researchers from GE and the Materials and Manufacturing Directorate tested and evaluated commercially available digital radiography panels to determine whether the products met criteria required by air logistics centers.

These criteria included the resolution of images taken by the panel, the size of the viewing area, pixel pitch, and imaging of real aircraft parts. The Varian 4030 amorphous silicon flat panel detector emerged as the detector of choice.

AXI developed the software package, which enables a technician to communicate with the detector panel, to capture a raw image, and to transfer the image to the data processing and viewing station. When the image has been transferred, a technician can retrieve the raw image, and process and analyze the data. Data filters and processing routines, which digitally enhance the image, can be applied to yield the best possible results.

The successful demonstration of digital radiography technology is a cost- and time-saving milestone, which aids the transition of this technology in the Advanced Technology Demonstration Digital Radiography Insertion Program.

The program focuses on specific Air Force depot applications to improve depot inspection capabilities. @



Charles Buynak, evaluates resolution and contrast capabilities of digital flat detector panel inspection results on a computer monitor after x-raying a line pair gage specimen at Hill Air Force Base, Utah. Inset - The Varian 4030 amorphous silicon (a-Si) flat panel detector.